

**WHAT IS CLAIMED IS:**

1. A programmable current controller comprising:
  - a programmable interface configured to program a digital reference in a memory,  
wherein the digital reference corresponds to a predetermined driving current  
for at least one illumination source;
  - 5 a digital-to-analog converter coupled to the programmable interface and configured to  
convert the digital reference into a first electrical parameter;
  - a comparator coupled to the programmable interface and configured to  
compare the first electrical parameter with a second electrical parameter  
corresponding to an operating driving current of the at least one  
10 illumination source, and
  - generate a driving bias current; and
- a current regulator coupled to the comparator and configured to  
regulate the operating driving current of the at least one illumination source  
according to the driving bias current, wherein the driving bias current  
15 corresponds to a difference between the first and second electrical  
parameters.
2. A programmable current controller according to claim 1, wherein  
the comparator is a voltage comparator;  
the first electrical parameter is a voltage corresponding to the predetermined driving  
20 current for the at least one illumination source; and  
the second electrical parameter is a feedback voltage corresponding to the operating  
driving current of the at least one illumination source.
3. A programmable current controller according to claim 1, wherein  
the comparator is a current detector;  
the first electrical parameter is a current corresponding to the predetermined driving  
25 current for the at least one illumination source; and

the second electrical parameter is a feedback current corresponding to the operating driving current of the at least one illumination source.

4. A programmable current controller according to claim 1, further comprising:  
a sensor coupled to the at least one illumination source and configured to measure the  
5 second electrical parameter.

5. A programmable current controller according to claim 5, wherein the sensor is  
a resistor.

6. A programmable current controller according to claim 1, wherein the  
programmable interface is an inter-integrated circuit serial interface.

10 7. A programmable current controller according to claim 1, wherein the  
programmable interface is a three-wire serial interface.

8. A programmable current controller according to claim 1, wherein the current  
regulator further comprises

15 a metal-oxide semiconductor transistor, wherein  
a gate terminal of the metal-oxide-semiconductor transistor receives the  
driving bias current,  
a drain terminal of the metal-oxide-semiconductor transistor is coupled to a  
power supply, and  
a source terminal of the metal-oxide-semiconductor transistor is grounded.

20 9. A programmable current controller according to claim 1, wherein the at least  
one illumination source comprises at least one light-emitting diode.

10. A display system comprising:  
a display panel having at least one illumination source; and  
a programmable current controller coupled to the at least one illumination source,  
25 wherein the programmable current controller is configured to regulate an

operating driving current of the at least one illumination source according to a digital reference corresponding to a predetermined reference driving current.

11. A display system according to claim 10, wherein the display panel is a liquid crystal display panel.

5 12. A display system according to claim 10, wherein the programmable current controller comprises:

a programmable interface configured to program the digital reference in a memory;  
a digital-to-analog converter coupled to the programmable interface and configured to convert the digital reference into a first electrical parameter;

10 a comparator coupled to the programmable interface and configured to compare the first electrical parameter with a second electrical parameter corresponding to the operating driving current of the at least one illumination source, and generate a driving bias current; and

15 a current regulator coupled to the comparator and configured to regulate the operating driving current of the at least one illumination source according to the driving bias current, wherein the driving bias current corresponds to a difference between the first and second electrical parameters.

20 13. A display system according to claim 12, wherein the programmable current controller further comprising:

a sensor coupled to the at least one illumination source and configured to measure the second electrical parameter.

25 14. A programmable current controller according to claim 12, wherein the sensor is a resistor.

15. A method of regulating an operating driving current for at least one illumination source of a display system comprising:

- measuring a first electrical parameter corresponding to the operating driving current of the at least one illumination source;
- converting a digital reference into a second electrical parameter, wherein the digital reference corresponds to a predetermined driving current for the at least one illumination source;
- comparing the first electrical parameter with the second electrical parameter; based on the comparison, generating a driving bias current; and regulating the operating driving current of the at least one illumination source according to the driving bias current.
- 10 16. A method according to claim 15, wherein the first electrical parameter is a feedback voltage corresponding to the operating driving current of the at least one illumination source; and the second electrical parameter is a voltage corresponding to the predetermined driving current for the at least one illumination source.
- 15 17. A method according to claim 15, wherein the first electrical parameter is a feedback current corresponding to the operating driving current of the at least one illumination source; and the second electrical parameter is a current corresponding to the predetermined driving current for the at least one illumination source.
- 20 18. A method according to claim 15, wherein the digital reference is stored in a memory.
19. A method according to claim 15, wherein the driving bias current corresponds to a difference between the first and second electrical parameters.
- 25 20. A method according to claim 15, wherein the display system is a liquid crystal display system.

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21. A method according to claim 15, wherein the at least one illumination source includes at least one light-emitting diode.